



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/900,688	07/06/2001	Mustafa Pinarbasi	SJ09-2000-0199US1	6711

32112 7590 06/20/2005

INTELLECTUAL PROPERTY LAW OFFICE  
1901 S. BASCOM AVENUE, SUITE 660  
CAMPBELL, CA 95008

EXAMINER

MAGEE, CHRISTOPHER R

ART UNIT PAPER NUMBER

2653

DATE MAILED: 06/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/900,688

**Applicant(s)**

PINARBASI, MUSTAFA

**Examiner**

Christopher R. Magee

**Art Unit**

2653

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 18-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 18-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Amendment*

1. The reply filed 04/04/2005 was applied to the following effect: All relevant drawing objections are withdrawn as being satisfied.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 23-26, 30, 36-39 and 43 are rejected under 35 U.S.C. 103(a) as being anticipated by Gill (hereinafter Gill '616) (US 6,674,616 B2) in view of Shukh et al. (hereinafter Shukh) (US 6,667,616 B1).

- Regarding claims 23 and 36, Gill '616 discloses a hard disk drive [30; Figs. 1-3], including at least one magnetic head [col. 5, lines 30-34; Fig. 6] including a spin valve sensor, having a read head [72] portion comprising:

- a magnetic shield layer (S1) [80] being fabricated above a substrate base;

- a first electrical insulation layer (G1) [76] being fabricated above said S1 layer;

- a spin valve sensor structure [74] being disposed above said G1 layer [76];

- wherein said spin valve sensor structure [74] includes a seed layer [218,220] being fabricated above said G1 layer [74], a PtMn layer [212] being disposed above said seed layer

Art Unit: 2653

[218,220] and at least one pinned magnetic layer [204] and at least one free magnetic layer [202] being disposed above said PtMn layer [74]; and

wherein said seed layer [218,220] has an upper surface comprised of NiFeCr [220].

Gill '616 does not disclose a rough top crystallographic surface that is rougher than a top crystallographic surface of a deposited NiFeCr seed layer.

Shukh teaches a seed layer [74] made of Ta, NiFeCr, Ru or CrV, which has a purpose to optimize a texture, grain size, and morphology of the subsequent layers. Shukh further teaches it is desirable to have a certain degree of roughness at the interface between ferromagnetic magnetic layer [80] and spacer [78], and between ferromagnetic layer [76] and spacer [78] (col. 4, lines 15-23).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the NiFeCr seed layer of Gill '616 with a rough crystallographic surface as taught by Shukh.

The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to provide the NiFeCr seed layer of Gill '616 with a rough crystallographic surface as taught by Shukh in order to facilitate transfer of electrons to subsequent layers where spin dependent scattering occurs (Shukh, col. 4, lines 25-26).

- Regarding claims 24-26 and 37-39, Gill '616 discloses the NiFeCr layer is formed with a thickness of approximately 20 Å [col. 7, lines 47-50; Fig. 10], which encompasses the claimed range.
- Regarding claims 30 and 43, Gill '616 teaches a spin valve sensor structure [74] includes at least one PtMn antiferromagnetic layer [212], at least one pinned magnetic layer [204] having

Art Unit: 2653

a composition which includes CoFe, at least one spacer layer [200] having a composition which includes Cu, and at least free magnetic layer [202] having a composition which includes NiFe [Fig. 10].

3. Claims 1-3, 18, 19, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill (hereinafter Gill '014) (US 6,430,014 B1) in view of Gill (hereinafter Gill '616) (US 6,674,616 B2) and further in view of Shukh et al. (hereinafter Shukh) (US 6,667,616 B1).

- Regarding claims 1, 2, 18, 19, 31 and 32, Gill '014 discloses a hard disk drive [30; Figs. 1-3], including at least one magnetic head [col. 5, lines 46-49; Figs. 6 and 11] including a spin valve sensor [130], having a read head [72] portion comprising:

- a magnetic shield layer (S1) [152] being fabricated above a substrate base;

- a first electrical insulation layer (G1) [148] being fabricated above said S1 layer;

- a spin valve sensor structure [200] being disposed above said G1 layer [148];

- wherein said spin valve sensor structure [200] includes a seed layer [228,230, 232] being fabricated above said G1 layer [148], a PtMn layer [214] being disposed above said seed layer [228,230, 232] and at least one pinned magnetic layer [204] and at least one free magnetic layer [206] being disposed above said PtMn layer [214]; and

- wherein said seed layer includes an  $\text{Al}_2\text{O}_3$  layer [228], and NiMnO layer [230] and a Ta layer [232] [Fig. 12].

Gill '014 does not disclose a seed layer including a NiFeCr layer but teaches other seed layer materials may be desired [col. 9, lines 40-41].

Art Unit: 2653

Gill '616 teaches a seed layer, with a thickness of 20 Å, to include Ta or NiFeCr [col. 7, lines 47-50; Fig. 10].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the Ta layer of Gill '014 with a NiFeCr layer as taught by Gill '616.

The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to substitute the Ta layer of Gill '014 with a NiFeCr layer as taught by Gill '616 because they are known seed layer materials that are used in spin valves and using them is merely a substitution of art recognized equivalents.

Furthermore, neither Gill '014 or Gill '616 teach the NiFeCr layer has a rough top crystallographic surface that is rougher than a top crystallographic surface of a deposited NiFeCr seed layer.

Shukh teaches a seed layer [74] made of Ta, NiFeCr, Ru or CrV, which has a purpose to optimize a texture, grain size, and morphology of the subsequent layers. Shukh further teaches it is desirable to have a certain degree of roughness at the interface between ferromagnetic magnetic layer [80] and spacer [78], and between ferromagnetic layer [76] and spacer [78] (col. 4, lines 15-23).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the NiFeCr seed layer of Gill '014 and Gill '616 with a rough crystallographic surface as taught by Shukh.

The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to provide the NiFeCr seed layer of Gill '014 and Gill '616 with a

Art Unit: 2653

rough crystallographic surface as taught by Shukh in order to facilitate transfer of electrons to subsequent layers where spin dependent scattering occurs (Shukh, col. 4, lines 25-26).

- Regarding claim 3, Gill '014 teaches a spin valve sensor structure [200] includes at least one PtMn antiferromagnetic layer [214], at least one pinned magnetic layer [204] having a composition which includes CoFe, at least one spacer layer [202] having a composition which includes Cu, and at least free magnetic layer [206] having a composition which includes NiFe [Fig. 12].

4. Claims 4-6, 20-22 and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill (hereinafter Gill '014) (US 6,430,014 B1), Gill (hereinafter Gill '616) (US 6,674,616 B2) and Shukh et al. (hereinafter Shukh) (US 6,667,616 B1) as applied to claims 1, 18 and 31 above, and further in view of Mao et al. (hereinafter Mao) (US 6,490,140 B1).

- Regarding claims 4-6, 20-22 and 33-35, Gill '014, Gill '616 and Shukh disclose all the features, *supra*, but do not show the composition of the NiFeCr layer as  $\text{Ni}_{49.5}\text{Fe}_{12.5}\text{Cr}_{38}$ .

Mao teaches the composition of seed layer [12] is preferably in the range of  $\text{Ni}_{60}\text{Fe}_{15}\text{Cr}_{25}$  to about  $\text{Ni}_{48}\text{Fe}_{12}\text{Cr}_{40}$  [col. 4, lines 30-37], which encompasses the claimed range.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to manufacture the NiFeCr layer of Gill '014, Gill '616 and Shukh with a NiFeCr composition as taught by Mao.

The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to manufacture the NiFeCr layer of Gill '014, Gill '616 and Shukh with a NiFeCr composition as taught by Mao in order to promote the texture and enhance the

Art Unit: 2653

grain growth of the free layer or pinning layer consequently grown on top of the seed layer [Mao; col. 1, lines 55-61].

Additionally, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation and optimization in the absence of criticality. *In re Swain et al.*, 33 CCPA (Patents) 1250, 156 F2d 239, 70 USPQ 412; *Minnesota Mining and Mfg. Co. v. Coe*, 69 App. D.C. 217, 99 F2d 986, 38 USPQ 213; *Allen et al. v. Coe*, 77 App. D.C. 324, 135 F2d 11, 57 USPQ 136.

5. Claims 27-29 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill (hereinafter Gill '616) (US 6,674,616 B2) and Shukh et al. (hereinafter Shukh) (US 6,667,616 B1) as applied to claims 23 and 36 above, and further in view of Mao et al. (hereinafter Mao) (US 6,490,140 B1).

- Regarding claims 27-29 and 40-42, Gill '616 and Shukh teach all the features, *supra*, but do not show the composition of the NiFeCr layer as  $\text{Ni}_{49.5}\text{Fe}_{12.5}\text{Cr}_{38}$ .

Mao teaches the composition of seed layer [12] is preferably in the range of  $\text{Ni}_{60}\text{Fe}_{15}\text{Cr}_{25}$  to about  $\text{Ni}_{48}\text{Fe}_{12}\text{Cr}_{40}$  [col. 4, lines 30-37], which encompasses the claimed range.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to manufacture the NiFeCr layer of Gill '616 and Shukh with a NiFeCr composition as taught by Mao.

The rationale is as follows: One of ordinary skill in the art at the time of the invention would have been motivated to manufacture the NiFeCr layer of Gill '616 and Shukh with a NiFeCr composition as taught by Mao in order to promote the texture and enhance the grain



Art Unit: 2653

growth of the free layer or pinning layer consequently grown on top of the seed layer [Mao; col. 1, lines 55-61].

Additionally, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation and optimization in the absence of criticality. *In re Swain et al.*, 33 CCPA (Patents) 1250, 156 F2d 239, 70 USPQ 412; *Minnesota Mining and Mfg. Co. v. Coe*, 69 App. D.C. 217, 99 F2d 986, 38 USPQ 213; *Allen et al. v. Coe*, 77 App. D.C. 324, 135 F2d 11, 57 USPQ 136.

### ***Response to Arguments***

6. Applicant's arguments with respect to claims 1-6 and 18-43 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,


Art Unit: 2653

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

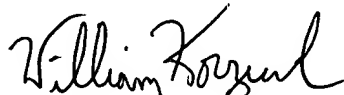
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher R. Magee whose telephone number is (571) 272-7592. The examiner can normally be reached on M-F, 8: 00 am-5: 30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on (571) 272-7589. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Christopher R. Magee  
Patent Examiner  
Art Unit 2653

June 14, 2005  
crm

  
WILLIAM KORZUCH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600